SEVERE LOCAL STORMS, APRIL 1941—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Tulsa, Okla.	19	5 a. m.	13	0	$300	Tornado	Trees blown down and a garage wrecked; path 67 yards long.
St. Joseph County, Ind.	19	3:40 p. m.			5,000	Wind	Two barns blown down.
Footville, Wis., south of	19	8:30 p. m.	100	0	10,000	Tornado	The funnel cloud lifted and dipped, skipping some farms in its path.
Rock County, Wis., western portion.	19	8:30-8:45 p. m.	[1] 6-8		25,000	Wind	Property damaged.
Huntington and Wells Counties, Ind.	19-20				1,000	do	Buildings damaged.
Wisconsin, east-central and southwestern counties.	19-20				50,000	Sleet, snow, and wind.	Hundreds of poles and wires down, mostly as a result of heavy, moist snow that froze and clung to wires, together with high winds. Ice began to freeze about 4 a. m., of the 20th, and remained on wires from 3 to 4 hours. Communication and electric service disrupted. Silo blown down and some wind damage to property.
Des Moines, Iowa	20				500	Wind	Airplanes staked out at the airport damaged.
Livingston County, Mich.	22			0	100,000	Tornado	The first sign of destructive force exerted by the storm was the complete leveling of a barn in the southwestern end of the storm's path, about 5 miles north of Gregory. From this spot the trail could be plainly traced in a northeastern direction crossing U. S. Highway 16, about a mile west of Howell and apparently terminating about 5 miles east of Oak Grove at the intersection of the Oak-Grove-Argentine roads. Over the first half of the path, many of the buildings were completely demolished. In the latter part of the wake, structures were only partially destroyed and twisted. About 25 separate farms were struck, some being a total loss, while others had only minor damage. The wreckage from those hardest hit was scattered in a northeasterly direction for several hundred yards, with tin roofs being found as far away as a mile. Trees as large as 2 feet were twisted off 10 to 15 feet above the ground and lay in all directions. Many roads were temporarily blocked by fallen trees and telegraph poles. Few persons were injured, none seriously, and some cattle and poultry lost.
Anthony, N. Mex.	26	7 p. m.			1,000	Heavy hail	Loss to crops.
Munday, Tex.	30	9:30-11 p. m.	[1] 3		30,000	do	$20,000 loss to wheat, oats, and barley; $10,000 damage to buildings.

[1] Miles instead of yards.

[2] See Climatological Data, June 1941, for detailed report of tornadoes in Iowa, April 1941.

SOLAR RADIATION AND SUNSPOT DATA FOR MAY 1941

SOLAR RADIATION OBSERVATIONS

By Helen Cullinane

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr., and Albuquerque, N. Mex.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1936, will be found in the Monthly Weather Review, December 1937, pp. 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison, Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

Total solar and sky radiation during May was excessive at most stations, but somewhat below normal at Fairbanks, Blue Hill, and Friday Harbor.

Radiation at normal incidence was somewhat below normal at Madison, but very irregular at Blue Hill.

Polarization observations made at Madison on 9 days gave a mean of 55 percent, 1 percent below normal, with a maximum of 66, 2 percent above the normal maximum for the month.

Table 1.—*Solar radiation intensities during April 1941*

[Gram-calories per minute per square centimeter of normal surface]

Blue Hill Observatory

Date	Sun's zenith distance										
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.					P. M.				
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Apr. 3	3.5						1.18	0.91	0.69	0.55	3.0
Apr. 4	3.6	0.83	0.93								4.4
Apr. 8	2.9	.94	1.04	1.14	1.22	1.40	1.20				4.2
Apr. 9	3.8	.94	1.04	1.14	1.25	1.42					3.8
Apr. 10	3.6	.69	.79	.90			1.16	1.00	.89		3.5
Apr. 11	3.5					1.36	1.15	.98	.84	.72	5.4
Apr. 12	5.2	.78	.88	1.00	1.15		.96	.72	.63	.55	3.8
Apr. 17	6.8						1.00	.74	.51	.35	6.8
Apr. 18	6.5	.77	.87	.99	1.16	1.34	1.13	.91	.80	.69	5.8
Apr. 19	6.3					1.29	1.10	.92	.79	.66	7.1
Apr. 20	10.7						.81	.69	.57	.45	10.7
Apr. 21	6.1								.87	.77	4.0
Apr. 22	3.6	.90	1.00	1.13	1.26	1.48	1.24	1.06	.94	.84	2.8
Apr. 23	2.5	.88	.98	1.08	1.23						3.2
Apr. 25	5.0	.77	.86	.94			1.10	.86	.71	.62	6.1
Apr. 29	3.5	.79	.90								4.2
Apr. 30	6.1	.58	.69	.83	.99	1.24					4.8
Means		.81	.91	1.02	1.18	1.36	1.09	.88	.75	.62	
Departures		−.03	−.03	−.06	−.02	−.03	−.03	−.09	−.10	−.07	

*Extrapolated.

Solar radiation intensities during May 1941

Blue Hill Observatory

Date	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.				P. M.					
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
May 6	6.3	0.68	0.83	1.00	1.22						4.4
May 12	4.2				1.19	1.38					3.3
May 13	4.4	.73	.85	.98	1.10						5.0
May 14	6.5						0.96	0.87			6.1
May 15	6.5				.79						4.2
May 16	5.4	.77	.87	1.00	1.15	1.44		.82	.68	.57	4.8
May 18	5.4					1.54	1.27	1.13	1.00	.90	3.6
May 19	4.2	.87	.98	.96	1.27	1.47					3.2
May 20	5.8	.75	.84	.96	1.15	1.41	1.15				6.8
May 21	7.4			.84	.96		.89	.67	.52	.42	9.9
May 30	5.4						1.04	.83	.75	.65	4.0
May 31	5.6	.77	.87	1.02	1.20						5.0
Means		.76	.87	.98	1.11	1.45	1.06	.86	.72	.62	
Departures		+.06	0	−.05	0	+.09	−.03	−.04	−.04	−.06	

Madison, Wis.

Date	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.				P. M.					
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
May 5	8.8	0.38	0.44	0.55	0.81	1.19					10.6
May 7	8.8	.64	.77	.84	1.08	1.38					7.9
May 10	4.2	.73	.81	.95	1.18	1.50					5.4
May 13	7.0	.75	.84	.99	1.15	1.34					5.6
May 17	5.6	.80	.95	1.11	1.28	1.47					5.8
May 19	9.1				.86						9.8
May 20	11.0	.44	.65	.91							15.1
May 23	6.8	.40	.58	.76	1.01	1.31					5.8
May 24	6.5	.74	.88	1.03	1.22	1.49					5.0
May 26	8.8	.33	.44	.59	.86	1.33					13.6
May 28	15.6	.41	.53	.66	.86	1.32					18.6
Means		.56	.69	.84	1.03	1.37					
Departures		−.04	−.09	−.13	−.08	0					

*Extrapolated.

TABLE 2.—*Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Week beginning—	Washington	Madison	Lincoln	Chicago	New York	Fresno	Cambridge	Fairbanks	San Juan	La Jolla	Newport	New Orleans	Riverside	Blue Hill	Albuquerque	Friday Harbor	Ithaca
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
April 30	592	499	437	488	576	585	384	404	312	478	433	308	404	388	540	425	
May 7	539	559	537	540	495	659	438	441	556	601	453	635	616	408	741	559	478
May 14	562	557	549	538	571	687	622	248	469	535	603	614	588	618	740	396	488
May 21	588	600	589	631	597	665	446	444	406	597	514	460	595	436	552	665	482
May 28	320	400	487	388	488	708	460	536	488	581	506	277	567	445	657	558	492
DEPARTURES FROM WEEKLY NORMALS																	
April 30	+118	+52	−42	+80	+157	−31	−20	−2		−108	+3	−93	−133	−78		−101	
May 7	+76	+104	+75	+108	+85	+23	−32	−16		+13	−33	+196	+56	−86		+4	+49
May 14	+84	+78	+30	+97	+118	+34	+90	−198		+4	+60	+175	+60	+91		−135	+43
May 21	+87	+102	+31	+156	+156	+3	−48	−5		+82	−20	+35	+37	−40		+38	
May 28	−191	−95	−44	−92	+18	+33	0	+72		+17	−15	−188	+10	−102		0	+30
ACCUMULATED DEPARTURES ON JUNE 3, 1941																	
	+3,066	+3,059	−5,179	+6,160	+14,427	−3,437	−112	−2,331		−1,876	−21	+3,710	−3,766	−672		+3,892	

CORRECTIONS IN TABLE 2 FOR JANUARY, FEBRUARY, MARCH, AND APRIL 1941

New factors for the instruments at Chicago, Ill., and Fresno, Calif., make the following changes necessary in table 2:

Week beginning—	Chicago, Ill.		Fresno, Calif.	
	cal.	Departure	cal.	Departure
Jan. 1	115	+27	104	−38
Jan. 8	81	−1	167	+6
Jan. 15	100	−2	179	+1
Jan. 22	51	−71	169	−38
Jan. 29	129	+8	150	−32
Feb. 5	143	+2	163	−89
Feb. 12	151	−1	238	−44
Feb. 19	282	+94	248	0
Feb. 26	203	−13	142	−213
Mar. 5	275	+53	439	+44
Mar. 12	317	+72	343	−64
Mar. 19	378	+111	499	+55
Mar. 26	279	+17	401	−55
Apr. 2	299	−3	468	−36
Apr. 9	420	+66	417	−132
Apr. 16	312	−34	635	+50
Apr. 23	599	+206	594	+32

POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR MAY 1941

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1941			°	°	°	°				
May 1	*h. m.* 10 55	8079	−70	168	+17	73	121	3	VG	U.S. Naval.
		8075	−24	214	−3	24	42	10		
		8075	−14	224	+3	16	12	7		
		8075	−10	228	−1	11	170	7		
		8077	+44	282	+13	48	6	4		
		8078	+58	296	−8	58	61	5		
				(238)	(−4)		412	36		